

**QUARTERLY REPORT - PUBLIC PAGE**GTI PROJECT NUMBER 20460

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# In-field Welding and Coating Protocols

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## Results and Conclusions

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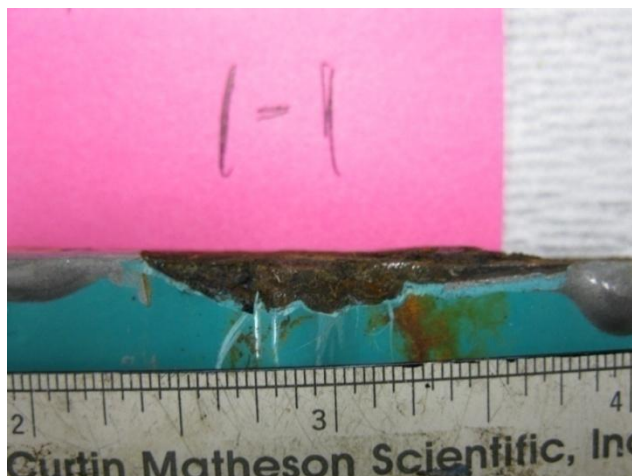
Tests were performed to evaluate hydrogen off-gassing and weld geometry effects on protective coatings. One set utilized simulated girth welds to evaluate the effects of weld cap height and undercut on a liquid applied protective coating. The second set of testing used in-field girth welds to evaluate the effects of hydrogen off-gassing on both liquid applied coatings and fusion bonded epoxy (FBE) coatings.

### 1.1 Simulated Girth Welds Results

The simulated girth welds investigated geometric affects of the weld on a liquid coating performance. Figure 1 and Figure 2 are examples of the results used in this analysis. These tests were performed with a brushable two part epoxy coating and accelerated corrosion testing was performed with a salt fog chamber. Undercut up to .03 inches was found to have no significant affect on a coatings resistance to corrosion. The undercut tended to add to the coating thickness and therefore increase its resistance to corrosion. Increasing cap height of a weld was found to thin the coating making it more susceptible to chipping. The salt fog environmental chamber did not preferentially accelerate the corrosion on the increasing cap height samples. The amount of corrosion growth was more dependent on the initial impact size which was dependent on the cap height. Applying proper coating procedures, especially surface profiling, the weld geometries investigated here had no strong negative effects on liquid two part epoxy coating performance.



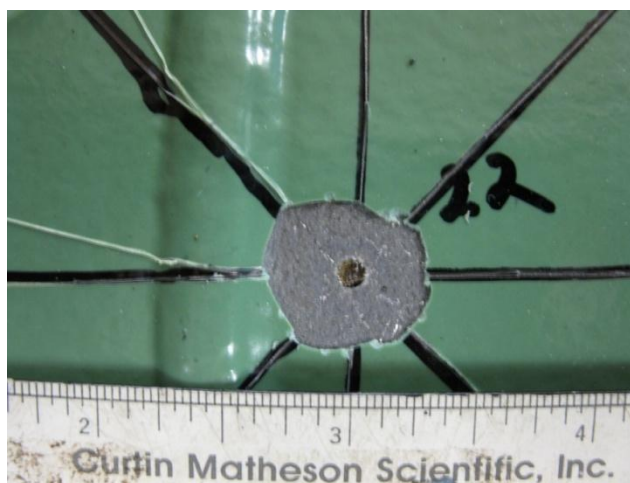
**Figure 1: Simulate girth weld after accelerated corrosion testing**



**Figure 2: Simulate girth weld after accelerated corrosion testing**

## 1.2 In-field Welds Results

The in-field welds were created to test the effects of hydrogen off-gassing on coating performance. Two different welding mediums were used, one with a high hydrogen content and one with a low hydrogen content. These different welds were then held for 2 or 4 hours to vary the amount of time allowed for Hydrogen off gassing and then coated in either FBE or a liquid 2 part epoxy. All other variables were held as constant as possible. Cathodic disbondment testing, ASTM G-95, was performed to evaluate the coating's adhesion properties, and no detectable differences were found that could be attributed to the hydrogen off-gassing from the weld. A sample of the cathodic disbondment tests results is presented in The variance found in performance did not correlate with hold time and were within the range of tests previously performed by GTI. This indicates when using these welding mediums and properly preparing the pipe surface, a hold time of two hours is sufficient to minimize any hydrogen off-gassing effects.



**Figure 3: Post cathodic disbondment testing**

## Plans for Future Activity

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In the coming quarter EWI and GTI will begin drafting recommendations for procedural modifications to the welding and coating operations, focusing on increasing coordination between the two.

Respectfully Submitted,

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*End of Report*